REMARKS

The application has been carefully reviewed on the light of the Office Action dated May 14, 2004. Claim 6 has been amended. New claim 9 has been added. Claims 1-9 are pending.

Claims 1 -8 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (US 6,629,643) in view of Okano (JPO11-153666) and Furuya (US 6,164,538). This rejection is respectfully traversed.

Claims 1 and 8 recite, *inter alia,* "an ultrasonic wave sensor for detecting whether a card is present outside the card entrance when the card is discharged ...".

Nagata et al. teaches a magnetic sensor for detecting if a magnetic head is illegally mounted outside the card reading apparatus. Nagata et al. also employs a method for preventing illegal reading of a magnetic card by disrupting the motion of the magnetic card. Nagata et al. does not provide a card reader having an ultrasonic wave sensor for detecting if a card (magnetic or non-magnetic) is present outside the card entrance. Nagata et al. does not anticipate or render obvious the invention of claims 1 and 8.

The secondary reference to Okano discloses an arrangement for preventing mutual interference between two neighboring ultrasonic sensors[1]. Okano does not teach or suggest a card reader having "an ultrasonic wave sensor for detecting whether a card is present outside the card entrance when the card is discharged." Okano contains no disclosure related to how an ultrasonic sensor can be employed in a card reader to determine if a card has been properly discharged outside the card entrance or improperly captured. Okano provides no motivation to modify Nagata et al. to include

[1] A machine translation of Okano is attached.

an ultrasonic wave sensor as would be required for the proposed combination to produce the invention as presently recited in claims 1 and 8.

The Office Action suggests that one of skill in the art would be motivated to combine Nagata et al. and Okano "in order to determine whether a card is discharged in a proper manner" and to ensure "the safety of the reader from inappropriate objects from entering the reader." Applicant has carefully reviewed the references to Nagata et al. and Okano and has found no evidence in either one of an ability to determine if a card is discharged properly. Further, Nagata et al. and Okano contain no teaching or suggestion related to protecting the safety of the reader by distinguishing whether an object being inserted is "inappropriate." Instead, Nagata et al. relates to detection of a <u>stationary</u>, illegally <u>mounted</u> magnetic read head. Okano relates to the prevention of mutual interference between ultrasonic detectors, as might be used in a parking lot, for example, to prevent cars from damaging parking facilities. Lacking motivation to combine the references, the Office Actions fails to establish *prima facie* obviousness based on Nagata et al. and Okano.

Furuya et al. does not cure the deficiencies of Nagata et al. and Okano. Furuya et al. has been cited as providing a circuit for data output. Furuya et al. discloses a magnetic card reader capable of distinguishing between various types of cards using non-contacting magnetic sensors. Furuya et al. does not teach or suggest a card reader having an ultrasonic wave sensor as recited in claims 1 and 8 of the present application. Claims 1 and 8 are patentable over the proposed combination of Nagata et al., Okano and Furuya et al. Claims 2 and 4 depend from claim 1 and are patentable for at least the same reasons.

Claim 5 recites "an ultrasonic wave sensor comprising a transmitter to transmit ultrasonic waves outside the card entrance and a receiver to receive reflected

waves of ultrasonic waves from a body when the body is present at the card entrance." It further recites "a memory for storing as a reference duration a necessary duration from transmission of ultrasonic waves to reception in the case where a card is present outside the card entrance."

Neither Nagata et al. nor Okano teaches or suggests an ultrasonic wave sensor arrangement as recited in claim 5. The references also fail to suggest a necessary duration as a reference for determining if a card is properly discharged outside the card entrance. Instead, Okano discloses emitting ultrasonic waves repeatedly from an ultrasonic wave transmission element towards a monitoring region and receiving reflection waves appearing in a specific monitoring period. Okano also lacks a memory for storing the wave travel duration information as a reference duration as recited in claim 5. Okano further lacks any teaching or suggestion of an "abnormality determination unit" capable of making a comparison between duration times during card discharge to determine abnormalities. Accordingly, the subject matter of claim 5 is not rendered obvious from the combined teachings of Nagata and Okano. Furuya et al., cited as disclosing a data output circuit, does not cure deficiencies in Nagata et al. and Okano. Claim 5 is patentable over the proposed combination of Nagata et al., Okano and Furuya et al.

Claim 6 recites a card reader including, *inter alia,* "a sensor for detecting whether an object is present outside the card entrance." The sensor detects "whether a foreign body is present as said object at a time of standby for card processing and stores a reference value." The sensor also detects "whether the card is present as said object when the card conveyance mechanism discharges the card by comparing a discharge value to said reference value."

None of the cited references to Nagata et al., Okano and Furuya et al., taken alone or together, provide any teaching or suggestion of a card reader having a sensor that detects an object at a time of card processing standby, stores a reference value, and detects whether the card is present upon discharge "by comparing a discharge value to said reference value." Claim 6 is patentable over the cited references to Nagata et al., Okano, and Furuya et al.

The cited references also fail to teach or suggest the subject matter of newly added claim 9.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: September 10, 2004

Respectfully submitted,

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Attachment

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the incorrect detection prevention approach of the ultrasonic sensor which prevents the incorrect detection by the mutual intervention of two or more ultrasonic sensors arranged in the neighborhood, if it says in more detail about the incorrect detection prevention approach of an ultrasonic sensor.
[0002]
[Description of the Prior Art] Although the ultrasonic sensor is used for various body detection sensors from the comparatively cheap thing, when applied, for example as a car detection sensor in a parking lot, it is arranged per each parking area at the head-lining part etc. That is, 1 area will be supervised by one sensor.
[0003] As mentioned above, since a supersonic wave is an elastic wave, when two or more ultrasonic sensors have been arranged in the neighborhood, distinction of whether to discharge from a neighboring sensor whether it is what the reflected wave discharged by self is difficult for it, and the problem of the incorrect detection by the mutual intervention produces it.
[0004] Although more various cures than before are taken in order to solve this problem, fundamentally, he is trying for those all to distinguish a self supersonic wave and the others' supersonic wave in time, and then they introduce those three examples.
[0005] From one ultrasonic sensor, a supersonic wave is fired for every time amount Ta second, on the other hand, as for the 1st approach, a supersonic wave is fired for every different time amount Tb second from it from ultrasonic sensor [of another side] B noting that two ultrasonic sensors approach and are arranged.
[0006] And if spacing of the reflected wave which received is in agreement in an ultrasonic sensor at the periodic Ta second which self transmitted on the other hand, it will be judged that it is what is depended on self transmission. If spacing of the reflected wave which received is in agreement similarly about the ultrasonic sensor of another side at the periodic Tb second which self transmitted, it will be judged that it is what is depended on self transmission.
[0007] The 2nd approach gives the periodic table of an ultrasonic discharge period to each ultrasonic sensor, and fires a supersonic wave according to the periodic table. And if receiving spacing of a reflected wave is in agreement with the periodic table, it will be judged that it transmits by self. In this approach, since distinction of oneself and others is further carried out more to clarification, once a reflected wave is at least able to check that it is what is depended on self transmission, a discharge periodic table may be changed.
[0008] As the 3rd approach, each neighboring ultrasonic sensor is connected by the synchronous line, and there is a method of making coincidence discharge a supersonic wave from each of that ultrasonic sensor. Thus, possibility that the supersonic wave from a neighboring sensor will be detected becomes low by making it discharge a supersonic wave all at once from all ultrasonic sensors.
[0009]
[Problem(s) to be Solved by the Invention] However, by the 1st approach, even if a means to verify in time whether ultrasonic discharge spacing and its reflected wave receiving spacing are

in agreement is indispensable and performs it hardware-wise or by software, complication will be caused as the whole system.

[0010] In the 2nd approach, when a neighboring sensor operates in the same period or the same periodic table, distinction of the oneself and others of a reflected wave becomes impossible. Moreover, since this period is generally directly related to the body detection speed of response of a sensor, it is not desirable to change a period in vain.

[0011] the 3rd approach operates each ultrasonic sensor to coincidence — sufficient — although it is the easiest in control, it is required among many ultrasonic sensors to take about a synchronous line, and difficulty follows on the construction. Moreover, by this approach, since the monitor period after an oscillation also becomes the same by all sensors, interference may occur depending on the location of the body which should be detected.

[0012] Without having been made in order that this invention might solve such many conventional problems, and the purpose connecting each ultrasonic sensor by a synchronous line etc., it is a software-based comparatively easy configuration also in hardware, and is in offering the incorrect detection prevention approach of the ultrasonic sensor which enabled it to prevent the mutual intervention between each ultrasonic sensor.

[0013]

[Means for Solving the Problem] In the incorrect detection prevention approach of the ultrasonic sensor which prevents the incorrect detection by the mutual intervention of two or more ultrasonic sensors by which this invention has been arranged in the neighborhood in order to attain the above-mentioned purpose A supersonic wave is repeatedly discharged towards a monitor field from the ultrasonic transmitting component of each above-mentioned ultrasonic sensor. While making the ultrasonic discharge spacing irregular for every above-mentioned ultrasonic sensor in receiving the reflected wave which appears within a predetermined monitor period from the ultrasonic discharge point in time with an ultrasonic receiving component each time The sequential storage of the reflected wave received within the above-mentioned monitor period is carried out at a storage means, and it is characterized by detecting the existence of the body in the above-mentioned monitor field based on two or more reflected wave data memorized by this storage means.

[0014] Thus, since a reflected wave monitor period also becomes irregular irregularity, i.e., by supposing that it is random, according to this about the ultrasonic discharge spacing for every ultrasonic sensor, the probability to receive the supersonic wave from other ultrasonic sensors continuously within the reflected wave monitor period becomes very low.

[0015] Even if it received the supersonic wave from other ultrasonic sensors within the reflected wave monitor period, since he is trying to detect objective existence not only including the reflected wave data received this time but the reflected wave data received in the past, such as the last time and second from last time, for example, a mutual intervention can be eliminated by this invention.

[0016] That is, ultrasonic discharge timing will measure the reflected wave from the reflective object (quiescence body) which should be detected essentially from the discharge time of day in any condition, and it will appear in the same time location. Therefore, in detecting the existence of the body in a monitor field based on two or more reflected wave data within a storage means, when each reflected wave data is the same, these reflected wave data can be confirmed, and it can judge with the reflected wave from other ultrasonic sensors being contained in the case of nonidentity.

[0017] In that case, it can judge simply and correctly whether the reflected wave from other ultrasonic sensors is contained by setting, using a storage means as a frame memory, saving each reflected wave data as a reflected wave form at this frame memory, and contrasting the reflected wave forms.

[0018] In this invention, it has the random timing generation means which makes the ultrasonic discharge spacing irregular for every ultrasonic sensor. The timetable which has irregularity ultrasonic discharge spacing covering the multiple times set to this random timing generation means corresponding to the address assigned to each ultrasonic sensor and its address is prepared. The different address for every ultrasonic sensor will be set up, and each ultrasonic

sensor will repeat an irregular oscillation which is different based on the set-up self-address, respectively by this.
[0019] Moreover, it is desirable to make the primitive period of each ultrasonic sensor the same, and to make ultrasonic discharge spacing irregular into the primitive period, and according to this, the body detection speed of response of each ultrasonic sensor can be held down in dispersion in extent which is not made into a precision top problem.
[0020]
[Embodiment of the Invention] Next, when you understand the technical thought of this invention better, the example is explained, referring to a drawing.
[0021] When drawing 1 is the block diagram of the ultrasonic sensor 1 used by this invention and the application is the car detection sensor of a parking lot, the ultrasonic sensor 1 of the same configuration as this will be formed for every parking area of that, respectively.
[0022] This ultrasonic sensor 1 is divided into the transmitting system containing the ultrasonic transmitting component 10 of explanation, and the receiving system containing the ultrasonic receiving component 20 for convenience.
[0023] The random timing data table 11 for firing a supersonic wave is prepared for the irregular target (random) from the ultrasonic transmitting component 10 at the transmitting system. The data table as shown in drawing 2 is beforehand set to this random timing data table 11.
[0024] That is, this data table takes the address number 1 of a predetermined number, and 2 — to left column ****, it is the timetable which made the horizontal train the order (the 1st time, the 2nd time, 3rd time —) of the count of ultrasonic discharge, and the data of whether to fire a supersonic wave in what mm second from the time of discharge (or base period) last time along with the order of the count of ultrasonic discharge for every address number of that are written in.
[0025] This ultrasonic discharge time data is data which have regularity between the addresses and in neither of the order of the count of ultrasonic discharge, and it is [in / this semantics] desirable to set up using a random number.
[0026] The address of this data table is suitably chosen by the user through the address switch 12 prepared in each ultrasonic sensor 1. That is, if the self address is set as the address 1 by the address switch 12, with a central processing unit (CPU) 13, the timetable of the address 1 will be read and it will be set to a timer 14.
[0027] According to this timetable, since the 1st oscillation timing is 200 mses, let the latency time until it oscillates be 200 mses. The 2nd oscillation latency time is 350 mses, and after doing in this way and oscillating n times, it returns to the 1st oscillation timing.
[0028] Thus, the ultrasonic discharge time data read by CPU13 is given to the ultrasonic drive circuit 15, and the ultrasonic transmitting component 10 drives it according to the timing.
[0029] In a receiving system, the reflected wave received with the ultrasonic receiving component 20 is given to the reflected wave form digitization circuit 22 through the reflected wave receiving circuit 21. In this example, the reflected wave form digitization circuit 22 has a detector circuit and an A/D-conversion circuit, for example, acquires a detection wave like drawing 3 (a) from a reflected wave in that detector circuit, then carries out A/D conversion of this detection wave, and makes it a digital reflected wave form as shown in this drawing (b).
[0030] Incidentally, in the detection wave of drawing 3 (a), although a right-hand side big peak wave is a thing from a floor line, a left-hand side small peak wave is based on either a detection body (this example car) or a mutual intervention. In addition, a comparator is used instead of an A/D-conversion circuit, and you may make it extract a reflected wave form for the detection wave of a reflected wave as ON and off digital information with a suitable threshold.
[0031] As mentioned above, the reflected wave form by which A/D conversion was carried out in the reflected wave form digitization circuit 22 is saved at a frame memory 23 (save). In this case, after ultrasonic discharge directing to the transmitting system according [digitization of the monitor period timing of the reflected wave which can be set a receiving system, i.e., a reflected wave form,] to CPU13, that activation is directed using a timer 14, and thereby, the time-axis length of a reflected wave is controlled uniformly.
[0032] That is, digitization of a reflected wave form is performed with a transmitting system and

a fixed synchronization, and termination of digitization processing is also controlled uniformly in time. Thus, whenever a supersonic wave is discharged from the ultrasonic transmitting component 10, a reflected wave form can be acquired by making fixed time amount into a reflected wave monitor period from the discharge time.
[0033] To drawing 4 , the relation of the ultrasonic discharge timing and the reflected wave monitor period of two ultrasonic sensors 1A and 1B by which contiguity arrangement was carried out is illustrated. As shown in this drawing, the ultrasonic discharge spacing TA1 and TA2 of one ultrasonic sensor 1A and TA3 — are based on the address number 1 of the data table of drawing 2 , and the ultrasonic discharge spacing TB1 and TB2 of ultrasonic sensor 1B of another side and TB3 — are based on the address number 2 of this data table, and although the discharge spacing is random respectively, it sets the reflected wave monitor period RW always constant.
[0034] Moreover, the writing of the reflected wave data to a frame memory 23 is also performed by CPU13. Namely, CPU13 is saved one by one as mentioned above at a frame memory 23 by using as one-frame data the reflected wave form digitized with the transmitting system and the fixed synchronization. Thus, the reflected wave form covering multiple times is saved.
[0035] In this invention, it judges whether the reflected wave by the mutual intervention is contained in it based on the reflected wave form saved to the frame memory 23. What is necessary is preparing a frame memory analysis circuit etc. separately and making it just make frame memory data calculate in this example, although that judgment function is given to CPU13, when processing this in hardware.
[0036] Drawing 5 is the image Fig. of the reflected wave form of past 3 batch saved at the frame memory 23. In addition, in this example, although a reflected wave form is originally a digital wave, it is shown as the expedient top of explanation, and an analog wave.
[0037] In the analysis of a frame memory, those waves compare the reflected wave form W1 of this past 3 batch, i.e., the newest (this time) received reflected wave form, the last received reflected wave form W2, and received reflected wave form W3 before last, for example.
[0038] In this example, reflective peak wave P1 is a thing from a floor line, and each reflected wave form W1 - W3 have appeared in the same location. On the other hand, reflective peak wave P2 [another] have appeared in the newest received reflected wave form W1 on the left-hand side of reflective peak wave P1.
[0039] Although reflective peak wave P2 should appear in the same location also as the last received reflected wave form W2 and received reflected wave form W3 before last since ultrasonic discharge spacing is a ms unit if based on bodies which do not move, such as a car which these reflective peak wave P2 have parked, in this example, it does not exist in the reflected wave form W2 and W3.
[0040] Therefore, in such a case, it is judged that reflective peak wave P2 have high possibility of being based on a mutual intervention. In addition, although this example is comparing the reflected wave form of past 3 batch, this is a kind of filter actuation, and the number of the reflected wave forms made applicable [for analyzing] to a comparison is arbitrary.
[0041] Moreover, in order to cover a filter over the reflected wave form by the mutual intervention as mentioned above, approaches, such as taking the wave-AND between each reflected wave form, or taking averaging, can be illustrated.
[0042] On the other hand, if it says in the example of drawing 5 when a car exists in parking area, as shown in all each reflected wave forms W1 - W3 at drawing 6 , reflective peak wave P3 by the parking car will appear in the left-hand side with reflective peak wave P1 from a floor line. Here, left-hand side is that a reflected wave comes back early in time than a floor line, and means that a reflective object is between a floor line and a sensor.
[0043] Thus, detection of a body gives the result to an output circuit 25. This output circuit 25 may be the relay and LED (light emitting diode) which were carried in the ultrasonic sensor.
[0044] Although these reflective peak wave P3 are detected by relation for example, with threshold level L, that threshold level L will be suitably set up on the basis of the reflection from the head-lining side of a car etc. in this case.
[0045] Since reflective peak wave P3 are what is depended on reflection from a place higher than a floor line, i.e., the place near a sensor, they reach the ultrasonic receiving component 20

quickly rather than reflective peak wave P1 from a floor line in time.
[0046] the case where, as for the existence of a detection body, a reflected wave exceeds threshold level L fundamentally -- "-- it is -- " -- the case where it does not exceed is judged to be "nothing." Therefore, in order not to use reflective peak wave P1 from a floor line as a detection object, this example has canceled the threshold by the predetermined time amount width of face Tth as shown in drawing 6 .
[0047] Next, a primitive period is set as each ultrasonic sensor 1, as another example, the case where a supersonic wave is fired at random within the primitive period is added, and the timing chart of the operation flow chart of drawing 7 and dispatch of drawing 8 , and reception is explained for it in more detail.
[0048] First, after initialization of the control system of this ultrasonic sensor 1 that contains CPU13 in a step ST 1 is performed, a primitive period TO is set up by CPU13 at a step ST 2. In this example, a primitive period TO is set as 750 mses, and a supersonic wave is surely discharged once within this primitive period TO.
[0049] This primitive period TO is set up in common about all the ultrasonic sensors 1, and, thereby, detection time until it results in that reflected wave reception, filtering actuation, and body detection is secured from the ultrasonic oscillation of an ultrasonic sensor 1.
[0050] Next, in a step ST 3, CPU13 obtains the self-address set up by the user from an address switch 12. In addition, in relation with the ultrasonic sensor installed in the neighborhood, assignment of this self-address is beforehand set up by the user so that ultrasonic discharge timing may differ.
[0051] Thus, if the self-address is specified, in a step ST 4, each ultrasonic sensor 1 will read the ultrasonic discharge latency-time data set up in order of the count of ultrasonic discharge from the timetable belonging to the address number, and will discharge a supersonic wave from the ultrasonic transmitting component 10 based on the data.
[0052] Ultrasonic sensor 1A is explained as a representative, referring to the data table of drawing 2 , and the timing chart of drawing 8 for this actuation. Supposing ultrasonic sensor 1A acquires the address number 1 from an address switch 12, in a step ST 4, 200 mses will be first obtained as 1st discharge timing data TA 1.
[0053] After waiting until 200 mses pass from the first stage point in time of a primitive period TO at a step ST 5, a supersonic wave is sent out at a step ST 6. That is, a supersonic wave is discharged [from the head of the Maine processing] towards monitor area from the ultrasonic transmitting component 10 after 200 mses.
[0054] And the reflected wave from monitor area is received at a step ST 7, and after acquiring a reflected wave form in the reflected wave form digitization circuit 22, the reflected wave form is saved at a step ST 8 at a frame memory 23.
[0055] Then, at a step ST 9, by past several contrast with a reflected wave form, although the noise by the mutual intervention is filtered, after waiting until it jumps a step ST 10 and a step ST 11 since the count of discharge of a supersonic wave is the 1st time, and TO time amount which is a primitive period at a step ST 12 passes in this case, it returns to a step ST 4. By waiting for this primitive period TO time amount, the response speed of an ultrasonic sensor can be dedicated in a fixed error.
[0056] And 350 mses are obtained from a data table as 2nd discharge timing data TA 2 at a step ST 4. Then, a supersonic wave is discharged after 350 mses from the head of the Maine processing this time. Thus, sequential discharge of the supersonic wave is carried out by discharge timing TA 1 which is different from the first stage point in time of each primitive period TO towards monitor area from the ultrasonic transmitting component 10, and TA2 --.
[0057] Thereby, each of that reflected wave form is saved for the ultrasonic discharge of every at a frame memory 23, and filtering of the noise by the mutual intervention is performed at a step ST 9 in 2nd henceforth by the past several contrast with a reflected wave form.
[0058] It is judged whether the car (body) was detected at a step ST 10 after an appropriate time, a relay of the display lamp which is step ST11a if it is YES, for example, displays the existence of a car is turned ON, and the display lamp is made to turn on. When a car is not detected, a relay of a display lamp is made off by step ST11b.

[0059]
[Effect of the Invention] As explained above, when installing two or more ultrasonic sensors in the condition of having approached for every parking area of a parking lot, according to this invention, malfunction by the mutual intervention can be sharply reduced by having made ultrasonic discharge spacing of each ultrasonic sensor into irregularity (random), respectively.
[0060] Moreover, by memorizing reflected wave data for a sequential storage means, and contrasting each of those reflected wave data, when each reflected wave data is the same, these reflected wave data can be confirmed and, in the case of nonidentity, it can judge with the reflected wave from other ultrasonic sensors being contained.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the incorrect detection prevention approach of the ultrasonic sensor which prevents the incorrect detection by the mutual intervention of two or more ultrasonic sensors arranged in the neighborhood A supersonic wave is repeatedly discharged towards a monitor field from the ultrasonic transmitting component of each above-mentioned ultrasonic sensor. While making the ultrasonic discharge spacing irregular for every above-mentioned ultrasonic sensor in receiving the reflected wave which appears within a predetermined monitor period from the ultrasonic discharge point in time with an ultrasonic receiving component each time The incorrect detection prevention approach of the ultrasonic sensor which carries out the sequential storage of the reflected wave received within the above-mentioned monitor period at a storage means, and is characterized by detecting the existence of the body in the above-mentioned monitor field based on two or more reflected wave data memorized by this storage means.
[Claim 2] The incorrect detection prevention approach of the ultrasonic sensor according to claim 1 which in detecting the existence of the body in the above-mentioned monitor field based on two or more reflected wave data within the above-mentioned storage means confirms these reflected wave data when each reflected wave data is the same, and is characterized by judging with the reflected wave from other ultrasonic sensors being contained in the case of nonidentity.

[Claim 3] It is the incorrect detection prevention approach of the ultrasonic sensor according to claim 2 characterized by judging whether the above-mentioned reflected wave data are saved as a wave at this frame memory, and the reflected wave from other ultrasonic sensors is contained by contrast of the waves while the above-mentioned storage means consists of a frame memory.

[Claim 4] The incorrect detection prevention approach of the ultrasonic sensor according to claim 1 or 2 characterized by to have the random timing generation means which makes the ultrasonic discharge spacing irregular for every above-mentioned ultrasonic sensor, and for the address assigned to each above-mentioned ultrasonic sensor and the timetable which has irregularity ultrasonic discharge spacing data covering the multiple times set up corresponding to the address to be prepared in this random timing generation means, and to be controlled ultrasonic discharge spacing based on this timetable.
[Claim 5] The primitive period of each above-mentioned ultrasonic sensor is the incorrect detection prevention approach of the ultrasonic sensor according to claim 1, 2, or 4 characterized by supposing that it is the same and supposing that ultrasonic discharge spacing is irregular into the primitive period.

[Translation done.]

* NOTICES *

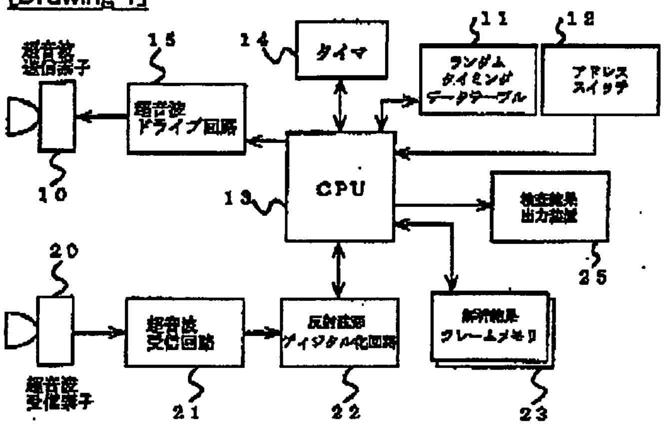
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram having shown one example of the ultrasonic sensor used for this invention.
[Drawing 2] The mimetic diagram for explaining the data table of the random timing generation circuit in the above-mentioned ultrasonic sensor.
[Drawing 3] The wave form chart having shown typically the ultrasonic wave received with the above-mentioned ultrasonic sensor.
[Drawing 4] The ultrasonic discharge TAIN MIG chart of the ultrasonic sensor by this invention.
[Drawing 5] The image Fig. having shown the reflected wave form saved at the frame memory of the above-mentioned ultrasonic sensor.
[Drawing 6] The mimetic diagram for explaining the threshold set up to the ultrasonic wave received with the above-mentioned ultrasonic sensor.
[Drawing 7] The operation flow chart about another example of this invention.
[Drawing 8] The ultrasonic discharge TAIN MIG chart in the example according to above.
[Description of Notations]
10 Ultrasonic Transmitting Component
11 Random Timing Data Table
12 Address Switch
13 CPU
14 Timer
15 Ultrasonic Drive Circuit
20 Ultrasonic Receiving Component
21 Ultrasonic Receiving Circuit
22 Reflected Wave Form Digitization Circuit
23 Frame Memory

[Translation done.]

DRAWINGS

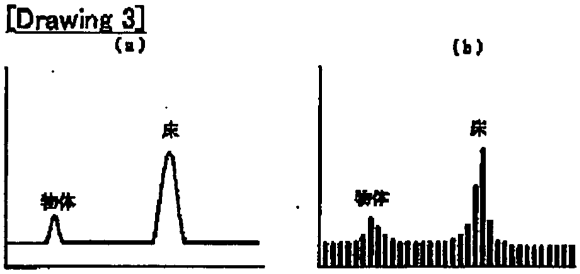
[Drawing 1]



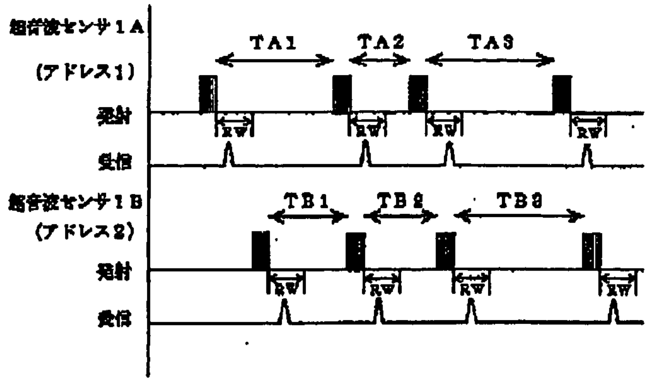
[Drawing 2]

T_j / アドレス	1回目	2回目	3回目	4回目	5回目	······
1	200	350	100	400	150	···
2	100	600	30	250	200	···
⋮	⋮	⋮	⋮	⋮	⋮	⋮

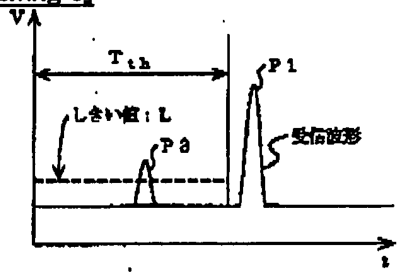
[Drawing 3]



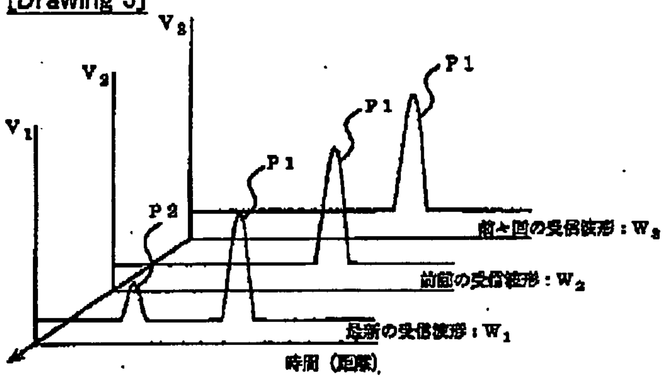
[Drawing 4]



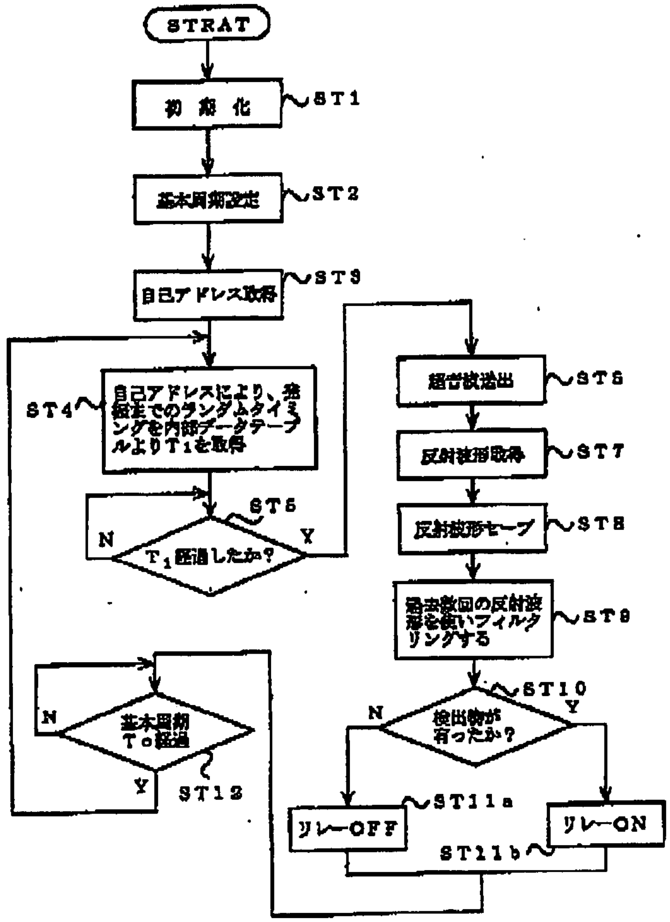
[Drawing 6]



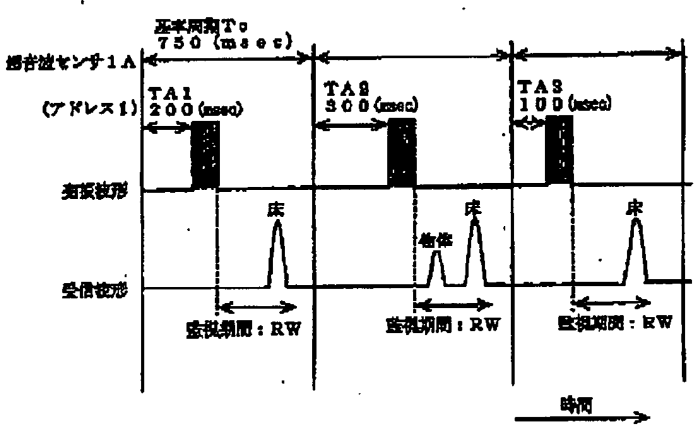
[Drawing 5]



[Drawing 7]



[Drawing 8]



[Translation done.]